

Graduate Management Project

U.S. Army-Baylor University Graduate Program
in Healthcare Administration

Evaluation of a New Hospitalist Service at an
Academic Medical Center

by

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A Project submitted in partial
fulfillment of the requirements
for the degree of

Masters in Healthcare Administration
U.S. Army-Baylor University Graduate Program
in Healthcare Administration

1999

Report Documentation Page			Form Approved OMB No. 0704-0188					
<p>Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p>								
1. REPORT DATE AUG 1999	2. REPORT TYPE Final	3. DATES COVERED Jul 1998 - July 1999						
4. TITLE AND SUBTITLE Evaluation of a New Hospitalist Service at an Academic Medical Center			5a. CONTRACT NUMBER					
			5b. GRANT NUMBER					
			5c. PROGRAM ELEMENT NUMBER					
6. AUTHOR(S) LCDR Joseph A Dacorta			5d. PROJECT NUMBER					
			5e. TASK NUMBER					
			5f. WORK UNIT NUMBER					
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Georgetown University Hospital 3900 Reservoir Rd, NW Washington, DC 2007-2197			8. PERFORMING ORGANIZATION REPORT NUMBER					
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) US Army Medical Department Center and School Bldg 2841 MCCS-HRA (US Army-Baylor Program in HCA) 3151 Scott Road, Suite 1412 Fort Sam Houston, TX 78234-6135			10. SPONSOR/MONITOR'S ACRONYM(S)					
			11. SPONSOR/MONITOR'S REPORT NUMBER(S) 34-99					
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited								
13. SUPPLEMENTARY NOTES								
14. ABSTRACT <p>Hospitalists, physicians, and physician extenders who specialize in the care of inpatients, are a new and growing trend in the American health system. There are about 3000 hospitalists practicing in 10 percent of hospitals. They are predominately young, male, general internal medicine specialists earning an average of \$143,000 per year. The experience with a trial hospitalist initiative at a large academic medical center mirrored the findings in the management literature, achieving reductions of 8 percent in length-of-stay (LOS) and 17 percent in cost-per-case, with lower mortality, unchanged readmission rates and no appreciable effect on patient or staff satisfaction, when compared to the rotating call system in place prior to the initiative. Further research is indicated regarding the use of physician extenders in hospitalist practice and the role of hospitalists in disease management and discharge planning.</p>								
15. SUBJECT TERMS hospitalist, Medical practice, physician								
16. SECURITY CLASSIFICATION OF: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">a. REPORT unclassified</td> <td style="width: 33%;">b. ABSTRACT unclassified</td> <td style="width: 33%;">c. THIS PAGE unclassified</td> </tr> </table>			a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified	17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 38	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified						

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Abstract

Hospitalists, physicians, and physician extenders who specialize in the care of inpatients, are a new and growing trend in the American health system. There are about 3000 hospitalists practicing in 10 percent of hospitals. They are predominately young, male, general internal medicine specialists earning an average of \$143,000 per year. The experience with a trial hospitalist initiative at a large academic medical center mirrored the findings in the management literature, achieving reductions of 8 percent in length-of-stay (LOS) and 17 percent in cost-per-case, with lower mortality, unchanged readmission rates and no appreciable effect on patient or staff satisfaction, when compared to the rotating call system in place prior to the initiative. Further research is indicated regarding the use of physician extenders in hospitalist practice and the role of hospitalists in disease management and discharge planning.

Evaluation of a New Hospitalist Service at an
Academic Medical Center

The trend towards the use of hospitalists (physicians and physician extenders who specialize in the care of inpatients referred from primary care physicians) is increasing, especially in markets with high managed care penetration as reported by the Washington Post (Boodman, 1997) and U.S. News and World Report (Brink, 1998). The hospitalist model, while common in Europe and Canada (Ajdari & Fein, 1998; Firschein, 1996), represents a profound departure from the traditional practice of medicine in this country (Ajdari & Fein; Chaty, 1998; Diamond, Goldberg, & Janosky, 1998; Firschein; Franzen, 1998; Huff, 1998; Southwick, 1997).

The Hospitalist Trend

The movement towards employing full time physicians to manage inpatient care of patients referred by primary care physicians is a new and growing phenomenon in American health care (Chaty, 1998; Darves, 1997; Jaklevic, 1998). The term "hospitalist" was coined by Wachter and Goldman in 1996, referring to a specialist in inpatient medicine who spends at least 25% of his or her time serving as the principal physician for inpatients who are "handed off" by their primary care physician at hospital admission and "handed back" at discharge. The use of inpatient specialists is common in Canada and the

United Kingdom (Firschein, 1996) but there were relatively few physicians practicing in this model before the early 1980s (Miner, 1998). The National Association of Inpatient Physicians estimates there are currently 2,500 to 3,000 hospitalists employed in the United States (Jaklevic). Currently, about 10 to 11 percent of U.S. hospitals use hospitalists (Chaty; Sammons, 1998, Rovzar, 1998). Humana, Inc., operates the largest hospitalist program, the Hospital Inpatient Management System (HIMS) (Darves). The HIMS pilot program, launched in 1994 in San Antonio, Texas, reduced patient days by more than one-third from 1995 to 1996 (Darves). Humana continued to implement hospitalist programs as a core strategy in other markets, and in 1997, HIMS generated cost savings of \$20 million for Humana, Inc. (Kertesz, 1998). Kaiser Permanente began using hospitalists in 1995 in six facilities in the San Francisco, California area. Kaiser Permanente's premise for expanding the use of hospitalists was that greater frequency of care leads to improved quality of care and to cost savings. This trend has its adherents and opponents, but the apparent success of hospitalists in decreasing length-of-stay and using fewer resources, while maintaining the same or greater quality outcomes, has attracted the interest of managed care organizations (MCOs). Some MCOs are mandating that a hospitalist attend their beneficiaries during their inpatient stay (Jaklevic). Primary care physicians are willing to accept the use of hospitalists, as they find themselves admitting fewer

but sicker inpatients and it becomes uneconomical to travel to and from one or more hospitals to round on one or two patients, while their ambulatory loads are increasing due to contractual commitments and market pressures (Darves). The patients they admit are now more acutely ill, requiring more complex interventions and greater intensity of clinical management. Additionally, the practice of inpatient care is increasingly informed, if not regulated, by practice guidelines, critical pathways and collaborative models of care. Hospitalists are thought to be able to achieve lower costs because they are often physically on-site, are more able to closely manage inpatient care, are able to respond more quickly to changes in the patient's condition, and are more likely to be familiar with the hospital's formal and informal administrative mechanisms (Seid, Quinn, Richardson, & Kurtin, 1997). Hospitalists are also thought to gain greater experience in inpatient care management than their community practice counterparts by virtue of their specialization in hospital practice. In theory, hospitalists can cut costs by reducing unnecessary admissions, specialty consultations, tests, and discharge delays, and improve quality by increasing adherence to commonly accepted treatment protocols (Seid, et al., 1997). The use of hospitalists is especially prevalent in areas of high-managed care penetration, and continued growth is expected (Wachter, Katz, Showstack, Bindman, & Goldman, 1998; Southwick, 1997).

Characteristics of Hospitalists

The majority of hospitalists are internal medicine physicians (Lindenauer, Pantilat, Katz, & Wachter, 1999; Miner, 1998) who see general internal medicine patients. Pediatricians represent a small, but growing group of hospitalists (Seid, et al., 1997; Lindenauer, et al., 1999). Some authors project increased utilization of hospitalists as labor and delivery specialists, and in the pre- and post-surgical care of general surgery patients (Morain, 1998). In a 1999 survey, Lindenauer, et al. found that hospitalists were young, primarily male, and only 48% had practiced hospital-based medicine for longer than two years. Eighty-nine percent of respondents were internists, of whom 51% were generalists and 38% subspecialists. The majority of hospitalists limited their practice to the inpatient setting but 37% practiced outpatient general internal medicine or subspecialty medicine in a limited capacity. In addition to their role in providing care for inpatients, 90% of the hospitalists were engaged in consultative medicine. Their most frequently reported non-clinical activities were quality assurance and practice guideline development (53% and 46%, respectively). Small group practices (31%) and staff model health maintenance organizations (HMOs) (25%) were the most commonly reported practice settings. Financial incentives were common (43%) but modest. Overall work satisfaction was high, and 80% of respondents predicted that they would still be

hospitalists in 3 years. Respondents to their survey typically admitted up to 10 patients per admitting period; individual patient censuses ranged from 5 or fewer to over 20 patients per hospitalist; the modal response was 11-15. Only 18% of hospitalists reported working with allied health practitioners to provide hospital care. The mean reported salary was \$145,300 (Lindenauer, et al.).

Advantages of Hospitalist Practice

Proponents of the hospitalist model claim that the use of hospitalists can improve clinical outcomes, reduce utilization of ancillary services, shorten length-of-stay, and improve the efficiency of the referring physician's ambulatory practices (Wachter, et al., 1998, Jaklevic, 1998). In theory, a hospitalist should be more efficient due to increased experience in caring for acutely ill patients, familiarity with hospital processes, availability on-site, and knowledge of case management requirements (Wachter, et al.; Moore, 1997; Grandinetti, 1998). Research designed to test this hypothesis, however, is sparse (Miner, 1998; La Puma, 1996). While support exists for a positive relationship between experience and outcomes for specific procedures (Moore) and conditions (Wachter, et al., Moore), there have been few published studies testing the hypothesis. Miner points out that what is known about the effectiveness of hospitalist systems in reducing the length and cost of hospital stays and their impact on patient satisfaction

is largely anecdotal. In fact, except for the findings of a prospective study conducted by Wachter et al. at the University of California, and a retrospective cohort study by Diamond et al. (1998), virtually no published data regarding outcomes are available. Anecdotal evidence of improved outcomes and cost containment consist of reports in management literature, rather than peer-reviewed journals. These reports suggest that the use of hospitalists can achieve significant reductions in cost and length-of-stay while maintaining or improving quality of care and patient satisfaction. Speer (1997) reported that the use of hospitalists at Mercy Hospital in Springfield, Massachusetts resulted in a one-day reduction in the average length-of-stay, with fewer costs incurred for the care of their patients than for others with the same diagnosis cared for under traditional approaches. Furthermore, surveys showed that 97 percent of the patients were satisfied or very satisfied with hospitalist care (Speer). The Park Nicollet Clinic in Minneapolis, Minnesota saw average stays drop by a half-day and costs decline by 20 percent, with no loss of patient satisfaction. Clinic outpatients also reported easier access to appointments and less time spent in the waiting room (Speer). The Pacific Business Group on Health (a coalition of healthcare purchasers in San Francisco that represents approximately 2.5 million covered lives, the majority of whom are enrolled in HMOs and Preferred Provider Organizations [PPOs]) reduced its utilization in some cases by 20 percent

through the use of hospitalists (Darves, 1997). This evidence has been sufficient for the rapid adoption of hospitalist models, especially by managed care organizations, some of whom are mandating hospitalist care for their beneficiaries (Lindenauer, et al., 1999; Jaklevic). In addition to reductions in lengths-of-stay and service utilization, hospitalist programs allow for increased office time for primary care physicians, improved efficiency of the practice group, increased capacity to accommodate outside referrals, and enhanced ability to respond to managed care entities' information and care coordination needs (Clinical Initiatives Center, 1999).

Concerns Regarding the Use of Hospitalists

Concern has been expressed that (a) patients will be dissatisfied because of the lack of continuity of care, (b) referring physicians will be dissatisfied because of the loss of control of their patients, (c) costs may be higher for the hospital, and, perhaps most important, (d) health status outcomes may be adversely affected by the transfer of responsibility for a patient from a primary care physician to an inpatient generalist physician. Communication regarding patient progress and breaks in continuity of care have been cited as the major problems related to the hospitalist model (Seid, et al., 1997). The mandatory hand-off, practiced by some health plans, is a major issue that exacerbates problems related to cooperation between providers, and thus communication and continuity of care may

suffer. Seid et al. also noted that hospitalists do not have the prior experience of the primary care physician regarding compliance, response to illness and therapeutics, and mental health issues. Additionally, there may be confusion about end-of-life care, advance directives, and other wishes that the patient communicated to the primary care provider. There is also a concern that hospital based physicians may be more aggressive and technology-oriented thus tending toward overutilization of services. To address these concerns and assess the full impact of a hospitalist model, rigorous evaluations must be conducted to provide convincing evidence about health status outcomes, satisfaction of patients, providers, and trainees, and the costs of care.

Financing of Hospitalist Services

Hospitalist program costs are compensated by a variety of methods from a variety of sources, with some or all of the costs paid by managed care organizations, physician practice groups, and individual hospitals, as contracted or salaried employees (Southwick, 1997). The four primary methods of supporting program costs are (a) pure fee-for-service, (b) salary-based or salary-plus-performance incentive, (c) paid by the hospital or health system, or (d) under capitated arrangements. Table 1 shows the results of one hospitalist compensation survey (Lindenauer, et al., 1999); the majority (78%) of hospitalists were primarily reimbursed through salary or salary plus

performance incentive. Incentive programs are based on meeting productivity or quality objectives. However, hospitalists may reduce the income of hospitals reimbursed on a per diem rate because of decreases in lengths-of-stay with a consequent reduction in commercial days, unless gross admissions are increased. Hospitalists stand to benefit health systems in highly capitated markets, hospitals paid by diagnosis related groups (DRGs), and clinical enterprises paid on a contract rate. Clinical fees from inpatient services alone are usually inadequate to cover salary and program expenses.

Table 1

Primary Types of Hospitalist Reimbursement

Type	Percent
Salary	56.8
Salary-plus-performance incentive	21.5
Fee-for-service	15.7
Per-member per-month payments (capitation)	3.6

Hospitalists at Georgetown University Medical Center

The Medical Center

Georgetown University Medical Center consists of a medical school, a hospital, satellite primary care and radiological

clinics, and a medical research enterprise. At the time of the study, Georgetown University Hospital was a stand-alone, private, not-for-profit, 336 bed acute care teaching facility located in an urban setting with low to moderate, but increasing, managed care penetration. During that timeframe, the hospital averaged 1200 discharges per month and occupancy rates ranged between 67% and 77%. The payor mix was: 31% HMO/PPO, 30% Commercial, 26% Medicare, and 8% Medicaid. Georgetown University owned the Medical Center. The clinical faculty practiced within a Faculty Practice Group, organized on a departmental model. The Faculty Practice Group operated as a financially independent entity that collected and retained professional fees from the clinical activities of the faculty, from which they paid the hospital a facility fee. The medical center, like many academic medical centers, was facing numerous challenges in financing its multiple missions of direct care, clinical research, and medical education; therefore, funding for new initiatives required thorough scrutiny for cost-effectiveness, return-on-investment, and impact-on-mission.

Establishment of the Hospitalist Service

The Department of Medicine of Georgetown University Medical Center established a hospitalist program in September 1998 with startup funding from the Medical Center. Prior to implementation of the program, the 13 Faculty Practice Internal Medicine Department physicians took one-month rotations as on-call

attending physicians. While on-call, these physicians were unavailable for outpatient care. Beginning in September 1998, general internal medicine Faculty Practice Group physicians were required to admit their general internal medicine patients to the hospitalist service. Community physicians were offered the option to participate in the hospitalist program. The major reason for implementing the program was to improve efficiency in the Faculty Practice Group by relieving the requirement for faculty physicians to rotate attending duties, thus freeing up more ambulatory care appointment times. Other reasons included the potential to improve clinical outcomes and clinical efficiency, increased capacity to accommodate outside referrals, and an enhanced ability to respond to managed care entities' information and coordination of care requirements. The Department of Medicine recruited two internal medicine specialists and a nurse practitioner to manage all the general internal medicine admissions from the Department of Medicine's Faculty Practice Group. Georgetown elected to appoint the hospitalists and the hospitalist nurse practitioner as faculty members in the General Internal Medicine Department. They receive a guaranteed salary plus a distribution of excess revenue after departmental expenses and other departmental obligations have been met. The hospitalists have no scheduled outpatient responsibilities and they perform general medicine consultations

when requested, usually pre-operative work-ups and emergency room consultations.

Financing the Hospitalist Service

The start-up and salary expense for the program was initially funded through the Medical Center's Management Services Organization (MSO). The hospital business unit provided one clerical full time equivalent (FTE) to support the hospitalist program. The MSO expenses were allocated fairly evenly across the Faculty Practice Group and the hospital. The MSO was disestablished following the initiation of the hospitalist program. Continued funding of the hospitalist program was expected to come from the Department of Medicine and the hospital, in a to-be-negotiated allocation. The hospital enterprise expected to derive a benefit from reduced resource utilization for those patients whose payors reimburse on a prospective (DRG or case-rate) method, but would lose revenue from per-diem or fee-for-service payment methods if they were unable to reduce staffing or increase admissions to backfill the empty beds. The Department of Internal Medicine would derive a benefit from increased availability of outpatient appointment slots and the continued revenue derived from inpatient billings of the hospitalist providers. The Medical Center now faces the following questions:

1. Has the program met expectations?

2. Should it be discontinued, expanded, or should it remain at the current level?

3. If the program is continued, how should the program costs be fairly allocated?

4. Have there been any negative or undesirable effects as a result of the program?

Study Objectives

The primary purpose of the study was to develop an allocation methodology for subsidizing the costs of the hospitalist program between the hospital and the Department of Medicine. The supporting objective and secondary purpose of this study was to compare the clinical efficiency of hospitalists with non-hospitalist physicians. The hypotheses were:

1. Patients managed by hospitalists have lower utilization of ancillary services.

2. Patients managed by hospitalists have shorter average lengths-of-stay.

3. Patients managed by hospitalists have fewer readmissions.

4. Patients managed by hospitalists have lower mortality.

5. Patients managed by hospitalists are no less satisfied with their care.

Method

This was a retrospective cohort study. All admissions to the General Internal Medicine Service from September 1998 to March 1999 were extracted from the medical center's financial database (Transition Systems International [TSI], Boston, MA). The admissions were divided into categories based on the name of the discharging physician. All patients discharged by hospitalist physicians were assigned to the hospitalist group; the remaining patients were assigned to the general medicine group. The two groups were evaluated for differences in patient age, acuity, and case mix. The groups were then compared on the basis of financial and clinical outcomes data. In order to reduce the effects of outliers, a second analysis was then performed, trimming all cases that exceeded three standard deviations from the mean for the parameters of length-of-stay and resource utilization. Length-of-stay and resource utilization were also adjusted for acuity using the Health Care Financing Administration's (HCFA) Case Mix Index (CMI) relative weighting system. For continuous data, such as age, length-of-stay and cost-per-admission, a student's t test was used for between-group comparisons; normalcy of distribution was assumed. For the categorical outcome variables such as readmissions and mortality,

the Chi-square test was used. Findings were considered statistically significant at a p value less than .05. Patient satisfaction was measured using the standard Georgetown University Hospital survey instrument. The six-month period prior to initiation of the hospitalist program was compared to survey results taken during the trial period. The physician, physician-in-training, and nursing staff satisfaction measures were collected through interview by the author.

Reliability and validity

Measurement of hospital costs and length-of-stay data was abstracted from the TSI database, a standard and widely used health system financial data base. Errors in data collection and coding were assumed to occur systematically, without regard to the status of the admitting physician.

Results

Patient Population

Volume

The unadjusted sample size was 895 discharges. The hospitalist group discharged 510 patients, and the General Medicine group discharged 385 patients (Table 2). The two hospitalists and the nurse practitioner managed an average daily patient load (ADPL) of 17.6 versus general medicine's ADPL of 15.0.

Age

The hospitalist patients were significantly older than those seen by the general medicine group, $p = .0301$. The mean age of patients was 37.0 years in the hospitalist group and 31.58 years in the general medicine group. Patients over 65 years old represented 11.0 percent of the hospitalist group and 7.1 percent of the general medicine group.

Table 2

Summary of General Medicine and Hospitalist Performance

Sample	Factor	General		Hospitalist		p
		Medicine				Value
	Discharges	n=385		n=510		
Uncorrected	ALOS	M 7.14	or % 5.48	M 6.31	or % 7.46	.0281
	CMI	1.281	n/a	1.22	n/a	
	Mortality	3.38%	n/a	1.96%	n/a	.0268
	Readmission	3.65%	n/a	3.69%	n/a	.0976
	within 30 days					
	Avg. cost/case	\$9,455	\$10,684	\$7,661	\$8,912	.0038
Case Mix	Age	31.58	20.46	37.02	20.07	.0301
	ALOS	7.14	5.48	6.617	7.46	.0301
	Index (CMI)	1.281	n/a	1.222	n/a	
	Mortality	3.38%	n/a	2.06%	n/a	.0465
	Readmission	3.65%	n/a	3.87%	n/a	.9546
	within 30 days					
CMI & Outlier	Avg. cost/case	\$9,455	\$10,684	\$8,029	\$9,012	.0170
	ALOS	6.14	5.09	5.46	3.88	.0301
	CMI	1.281	n/a	1.222	n/a	
	Mortality	3.38%	n/a	2.06%	n/a	.0465
	Readmission	3.65%	n/a	3.87%	n/a	.9546
	within 30 days					
	Avg. cost/case	\$7,419	\$7,887	\$6,469	\$6,904	.0526

Case Mix

The Case Mix Index of the two groups were similar in terms of relative weighting (Table 2). Table 3 shows the ten most frequent discharge DRGs, prior to adjustment for outliers and mortality. The 10 most frequent diagnoses for the hospitalist group accounted for 36.71 percent of the hospitalists' discharges and 35.47 percent of the general medicine discharges. The general internal medicine providers were more likely to follow cardiac failure patients and the hospitalists were more likely to follow kidney and urinary tract infections and disorders of the pancreas.

Table 3

Comparison of Case Mix by Discharge Diagnosis

Diagnosis related group	General Medicine	Hospitalists
Simple pneumonia	9.09%	7.84%
Kidney and urinary tract infections	2.20	4.33
Disorders of the pancreas	0.90	3.92
Respiratory infections	4.41	3.71
Gastrointestinal hemorrhage with complications	2.48	3.30
Chest pain	2.75	2.89
Heart failure and shock	4.96	2.68
Esophagitis, gastroenteritis	4.13	2.68
Nutritional and metabolic disorders	2.75	2.68
Red blood cell disorders	1.80	2.68
Total	35.47	36.71

Severity

The hospitalists' patient group had a slightly lower overall CMI, 1.222 versus 1.281 for the general medicine group (Table 4).

Table 4

Case Mix Index

Type	General Medicine	Hospitalists
All Payors	1.155	1.144
Medicare	1.374	1.307
Overall	1.281	1.222

Clinical OutcomesMortality

The patients in the hospitalist group had a lower, statistically significant mortality rate compared to those in the general medicine group on both the CMI adjusted and the CMI unadjusted data, $p = .0267$ and $p = .0465$, respectively (Table 2).

Readmission rates

There was no significant difference between the CMI adjusted readmission rates between the groups, $p = .0956$ (Table 2).

Financial outcomesAverage length-of-stay (ALOS)

The unadjusted ALOS was significantly lower for the hospitalist group (11.5 percent, $p = .028$). When adjusted for CMI, the ALOS was 8.0 percent lower. When adjusted for CMI and outliers, the ALOS was 11.1 percent lower (Table 2).

Cost-per-case

The unadjusted cost-per-case was 18.97 percent lower for the hospitalist group (Table 2). When adjusted for CMI alone, the cost-per-case was 15.74 percent lower (Table 2). When adjusted for CMI and outliers, the cost-per-case was 16.79 percent lower (Table 2).

Resource Utilization

Table 5 shows the average costs for ancillary services for the two groups. The hospitalists used significantly less nursing, pharmacy, radiology, and laboratory services, but significantly more Operating Room services than the general medicine group.

Table 5

Comparative resource utilization (adjusted for CMI, but including outliers)

Department	General		Percent	
	Medicine	Hospitalists	Difference	Difference
Laboratory	\$ 691.00	\$ 575.12	\$ (115.88)	(16.77)
Pharmacy	1,343.00	1,132.56	(210.44)	(15.67)
Nursing	4,880.00	3,802.24	(1077.76)	(22.09)
Radiology	843.00	694.72	(148.28)	(17.59)
Cardiology	319.00	243.36	(75.64)	(23.71)
Emergency Room	215.00	210.08	(4.92)	(2.29)
Respiratory	812.00	690.56	(121.44)	(14.96)
Blood Bank	665.00	352.56	(312.44)	(46.98)
Physical Therapy	513.00	483.60	(29.40)	(5.73)
Observation Unit	1,377.00	1,362.40	(14.60)	(1.03)
Anesthesia	386.00	408.72	22.72	5.89
Operating Room	2,937.00	4,539.60	1602	54.57
Same Day Surgery	429.00	527.28	98.28	22.91
Neurology	331.00	324.48	(6.52)	(1.97)

Patient Satisfaction

Patient satisfaction was measured using Georgetown University Hospital's standard patient satisfaction survey instrument.

Patient satisfaction surveys collected on the General Medicine inpatient unit before and after implementation of the hospitalist program showed no difference for the parameters of satisfaction with "knowledge and courtesy of the physicians" and satisfaction with "access to your physician".

Impact on the teaching mission

Interviews with Internal Medicine Department house staff revealed no dissatisfaction with dedicated inpatient hospitalist physicians. The house staff and teaching physicians were especially appreciative of the development of the "uncovered service" which removed patients from the teaching service and assigned them to exclusive care of the hospitalist group. Reassigned patients were largely those waiting for placement in a long-term facility or those judged to have little additional teaching merit. Day-to-day patient management on this service was largely provided by the nurse practitioner. In interview, several of the house staff stated that the hospitalists were particularly effective in teaching the importance of early discharge planning.

Physician staff satisfaction

The Internal Medicine teaching faculty expressed satisfaction with the management of the patients they referred to

the hospitalist group, and reported high satisfaction with relief from call duties. They reported high satisfaction with the exchange of information regarding their patients admitted to the service, and the subsequent coordination of care following discharge. One of the thirteen faculty physicians expressed the desire to continue to maintain an inpatient and outpatient practice.

Nursing Staff Satisfaction

In interview, the nursing staff on the General Medicine units expressed a high degree of satisfaction with the hospitalist program. They perceived that the hospitalists had a higher degree of availability, responded to calls more promptly, and exhibited less variation in treatment approaches than the rotating faculty call schedule.

Discussion

The hospitalists achieved a lower cost-per-case and a lower average length-of-stay than the General Medicine Service, with little or no difference in clinical outcomes, patient satisfaction, or impact on the teaching mission. The savings to the hospital of the hospitalist model is approximately \$484,500 (\$950 x 510 admissions) for the six-month test period. Annualized, the net reduction in expense equals \$830,571.

Managerial Implications

At the conclusion of the study the results were evaluated according to the study objectives. The managerial findings and recommendations are discussed below.

1. Has the program met expectations?

For the hospital, the hospitalist program appeared to have met the expectations of reduced cost-per-discharge with no discernable adverse effect on clinical quality, patient or staff satisfaction. For the Faculty Practice Group, the program created additional outpatient appointment slots resulting in \$127,000 additional outpatient revenue and inpatient professional fees of \$176,000. The hospital realized a cost avoidance of approximately \$415,000 during the period of the study.

2. Should the program be discontinued, expanded, or should it remain at the current level?

The author's recommendation was to continue the program at the current staffing level, noting that two hospitalists and the hospitalist nurse practitioner managed an ADPL of 17.6 during the trial period. Lindenauer, et al. (1999) and the Clinical Initiatives Center (1999) suggest that an ADPL of 15 per hospitalist is readily achievable. While there are no staffing standards for inpatient physician extenders, the nurse practitioner member of the hospitalist team felt that she could

manage five to eight inpatients as primary provider-of-record, as well as rounding on the team's patients. The author recommended that additional staffing should not be considered until the hospitalists ADPL approached 30-35 patients. At that time consideration should be given to adding a dedicated discharge planner to the hospitalist team. Additionally, the hospitalists expressed interest in supporting the Quality Assurance Department's desire to develop and implement critical pathways for internal medicine patients.

3. If the program is continued, how should the program costs be fairly allocated?

The author recommended that the hospital continue to provide an administrative FTE in support of the program and agree to absorb one third of the difference between program expenses (salary, benefits, and insurance) and gross hospitalist inpatient revenue. Annualizing the trial period's level of effort would have produced a hospital contribution of \$45,000 plus the \$32,000 expense of the administrative/clerical FTE. In return, the General Internal Medicine Department would agree to support the development of critical pathways/case management in coordination with the Quality Assurance Department. Also, the General Medicine Department would agree to make physicians available for appointment as members to at least two of the hospital's standing committees (e.g., Infection Control, Utilization Review).

Finally, the hospitalists would be made available for visits to payors and community physician groups to promote the programs benefits. The annualized cost avoidance for the hospital would have been about \$830,471. At a bill-to-charges rate of 42 percent, this would have yielded a savings of \$348,000.

Increasing the ADPL of the hospitalists would increase inpatient professional fee revenue and savings to the hospital. At this level, the break-even point for program expenses is around 27 patients per day; the cost avoidance to the hospital would be approximately \$1,250,000, with a realizable savings of \$520,000.

4. Have there been any negative or undesirable effects as a result of the program?

No undesirable effects were noted during the trial period.

Limitations

This study had limitations in design and in execution. Since it was not a randomized, double-blind study, unaccounted for factors may have influenced the observed results. Possible explanations could include the differences in the effectiveness of the discharge planning service or other utilization management controls between the periods and groups studied and differences in acuity between the patient populations that were not visible under HCFA case mix index measurement. The study did not isolate the effect of years of practice experience on resource utilization. The hospitalist physicians were younger than the

rotating faculty members, and, therefore, were more likely to have received training in managed care and a greater sensitivity to cost control. Another factor that may have influenced the observed results is the proportion of patients that were considered "off-service" (i.e., those patients that were not considered teaching cases for the graduate education mission of the medical center), as teaching cases are generally understood to consume more resources than non-teaching cases. Prior to the institution of the hospitalist model, very few patients were put "off-service". The increase in off-service patients was attributable to the changes in Medicare reimbursement for long-term care, which caused artificially extended lengths-of-stay for patients otherwise ready for discharge. Random assignment of a concurrent cohort of patients to the hospitalist or faculty service may have reduced the unexplained variation. An additional limitation was adequate capture of outcome measures, specifically, readmission rates for the same complaint over time. Also, while same hospital readmissions were measured, there was no means to capture admission to other hospitals.

Opportunities for further research

Opportunities for further study include isolating the factors within hospitalist practice that may be responsible for reductions in lengths of stay and resource utilization. Preliminary research suggests that increased experience with acute hospitalizations and familiarity with hospital specific

administrative procedures, such as discharge planning and on-site or immediate availability of hospitalists, might contribute to the effectiveness of hospitalists. Additionally, future research might include a study of the suitability of hospitalist utilization in other than general internal medicine practice, such as surgery, obstetrics, pediatrics and orthopedics. Finally, this study suggested that the nurse practitioner contributed significantly to reduced resource consumption and timely discharge. Additional study into expanded roles for physician extenders who specialize in inpatient care is warranted. Payor and community physician satisfaction should also be assessed because the existence of a well-run hospitalist program may offer a hospital a competitive advantage, especially in over-bedded markets. Finally, research into the structuring and effectiveness of incentive programs for hospitalist providers should be conducted.

Conclusion

Academic medical centers are fully challenged in meeting their triple mission of direct care and community health, medical education, and clinical research, within the existing reimbursement structure. Hospitalist programs offer opportunities for reducing hospital expenses as well as creating the conditions necessary for introduction of case management initiatives. Health information systems are now sufficiently

mature to allow coordination of care between inpatient and outpatient settings. Military health systems may be able to reduce cost per discharge and overall expense from inpatient charges through adoption of the hospitalist model in its large teaching facilities, and in cooperative arrangements with civilian facilities where uniformed providers care for TriCare beneficiaries. The challenge will be to develop models of practice that assure coordination of care and benefits regardless of practice setting and to avoid the worst of the European experience, where the divisive separation of practice and professional stature between the community-based primary care practitioner and the hospital based consultant results in unnecessary duplication of effort and discontinuity of care.

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